

Comparing Drug Classes between MED-RT and SNOMED CT

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Abstract

Objectives. To compare drug classes between MED-RT and SNOMED CT. Our motivation for the comparison is to explore whether SNOMED CT classes could form the basis for drug value sets and clinical decision support, and be a potential alternative to MED-RT classes.

Methods. We compare the characteristics of the two drug classification systems for mechanism of action (MOA) and chemical structure (CHEM) classes. More specifically, we compare their basic characteristics (number of classes, hierarchical organization), coverage from the perspective of drug classes (i.e., number of classes with drug members at the ingredient level), and coverage from the perspective of drugs (i.e., number of drugs with a class). We also compare the coverage of drugs in SNOMED CT and MED-RT, overall (quantitatively) and for the 200 most-prescribed drugs (178 after eliminating multi-ingredient drugs). This work is based on the following terminological resources: U.S. Edition of SNOMED CT (March 2021), MED-RT (April 2021) and RxNorm (April 2021) accessed through the RxClass API (<https://rxnav.nlm.nih.gov/RxClassAPIs.html>).

Results.

Basic characteristics: SNOMED CT provides 322 MOA and 323 CHEM classes, while MED-RT provides 655 MOA and 9967 CHEM classes. The maximal depth of the MOA class hierarchy is 8 in MED-RT and 5 in SNOMED CT, while the maximal depth of the CHEM class hierarchy is 13 in MED-RT and 6 in SNOMED CT.

Coverage from the perspective of drug classes. SNOMED CT has 286 MOA and 284 CHEM classes with direct drug members, while MED-RT has 294 MOA and 246 CHEM classes with direct drug members. Of note, most CHEM classes in MED-RT have no drug members.

Coverage from the perspective of drugs. SNOMED CT MOA classes cover 1253 drugs, while its CHEM classes cover 2338 drugs. MED-RT MOA classes cover 823 drugs, while its CHEM classes cover 1277 drugs.

Quantitative comparison. Of the 1518 drugs classified for MOA overall, 558 are classified by both SNOMED CT and MED-RT, 695 are classified only in SNOMED CT and 265 classified only in MED-RT. Of the 3205 drugs classified for CHEM overall, 410 are classified by both SNOMED CT and MED-RT, 1928 are classified only in SNOMED CT and 867 classified only in MED-RT. Overall, SNOMED CT provides coverage for a larger number of drugs.

Qualitative comparison. For MOA, of the 178 most commonly prescribed (single-ingredient) drugs classified, 49% (88/178) are classified in both SNOMED CT and MED-RT (e.g., *atorvastatin*, *clonidine*, *estradiol*, *prednisone*, *sertraline*), while 11% (20/178) are classified only in SNOMED CT (e.g., *amoxicillin*, *gabapentin*, *lamotrigine*, *loratadine*, *progesterone*) and 9% (16/178) are classified only in MED-RT (e.g., *acyclovir*, *bupropion*, *fluticasone*, *tizanidine*, *warfarin*). Surprisingly, 30% of the drugs (54/178) were not classified in either system (e.g., *alprazolam*, *buspirone*, *metformin*, *nitroglycerin*, *phentermine*). For CHEM, of the 178 most commonly prescribed (single-ingredient) drugs classified, 26% (46/178) are classified in both SNOMED CT and MED-RT (e.g., *acyclovir*, *amoxicillin*, *clindamycin*, *fluconazole*, *lorazepam*), while 59% (106/178) are classified only in SNOMED CT (e.g., *albuterol*, *aspirin*, *atorvastatin*, *gabapentin*, *tramadol*) and 2% (4/178) are classified only in MED-RT (e.g., *isosorbide*, *levothyroxine*, *liothyronine*, *zolpidem*). About 13% of the drugs (23/178) were not classified in either system (e.g., *allopurinol*, *baclofen*, *cetirizine*, *montelukast*, *paroxetine*).

Conclusions. Our investigation shows that the coverage provided by SNOMED CT compares favorably to MED-RT's, even when focusing on the 200 most-prescribed drugs. Except for open access, no other characteristic of MED-RT makes it superior to SNOMED CT for drug classification, including for use in clinical decision support and value set creation.